

HP OpenView

Storage Mirroring application notes

High availability for Rational tools

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Storage Mirroring High availability for Rational tools application notes

Document overview

This document is a Storage Mirroring application note. An application note provides guidelines on the use of Storage Mirroring in a specific environment.

This document contains:

- **Document overview**—Explains what an application note contains, how it should be used, what you need to know before trying to use the application note, and where you can go for more information.
- **Solution overview**—Explains how the applications work with Storage Mirroring and describes the considerations that you must weigh when implementing your Storage Mirroring solution. Review this section to make sure that you understand the theory involved with using Storage Mirroring and your application. Includes both basics, such as system requirements, as well as configuration and environment-specific topics, such as interactions with specific clients or special considerations for WAN (Wide Area Network) environments. Pay special attention to those topics that are directly related to your environment.
- **Sample implementations**—Describes specific examples of how to use Storage Mirroring for this solution. Use these procedures as a guideline for creating your own implementation. Because no two environments or configurations are exactly the same, you will probably need to implement additional or different steps than what is documented here in order to make the solution work in your environment.

Audience

This document is written for network and application administrators who have a working understanding of the applications and environments where the Storage Mirroring solution is to be deployed. You may need to expand on the documented information in order to customize the solution to fit your environment.

Before you use this application note, you should have an understanding of:

- Storage Mirroring
- Rational Software

Expectations

Application notes are intended to provide a framework for configuring a Storage Mirroring solution in a specific environment and to draw attention to decisions you will need to make when configuring your solution.

Because there are an infinite number of possible configuration, network, and environment scenarios, application notes contain general configuration guidelines as well as an example configuration procedure that has been tested for a specific environment.

This document assumes that you are comfortable working with your operating system, Storage Mirroring, and Rational software.

Related documentation

Before you begin to configure your solution, make sure that you have complete documentation for your operating system, application(s), and Storage Mirroring. This application note does not provide step-by-step instructions for using standard operating system, application, and Storage Mirroring functionality.

The following documents contain additional information that you may need while setting up this solution:

- *HP OpenView Storage Mirroring user guide* or online documentation
- Reference guides or documentation for Rational Software

Getting help

Hewlett-Packard has application notes that describe how to configure Storage Mirroring with a variety of popular third-party applications. These application notes are available on the Storage Mirroring web site: <http://h18006.www1.hp.com/products/storage/software/sm/index.html>.

For help using Storage Mirroring, refer to the Storage Mirroring online manual or online help.

Solution overview

Rational Software provides a software development platform that improves the speed, quality, and predictability of software projects. This integrated, full life-cycle solution combines software engineering best practices, market-leading tools, and professional services. Storage Mirroring provides real-time enterprise data protection and replication. Storage Mirroring can be used to provide high availability for your Rational server.

This document describes the steps necessary to configure Storage Mirroring to provide high availability for Windows 2000 servers running the ClearCase, ClearQuest, and/or RequisitePro components of the Rational Software Suite. These procedures allow a secondary server to assume the identity and role of a failed Rational server. To complete these instructions, you will install Rational and Storage Mirroring, and configure Storage Mirroring for replication and failover. Due to the complexities of these applications, this document is intended for network administrators with experience installing, configuring, and maintaining network applications including Storage Mirroring and Rational.

Modifying the sample script files

After you modify the sample scripts, save them with a new name to remove the `SAMPLE_` prefix. Copy the scripts to the directory where Storage Mirroring is installed.

The sample batch files provided are only examples. Because no two environments or configurations are exactly the same, you **MUST** modify the sample scripts in order to make the solution work in your environment.

Enabling compression

By enabling compression, you can reduce the amount of bandwidth needed to transmit Storage Mirroring data. When compression is enabled, the data is compressed before it is transmitted from the source. When the target receives the compressed data, it uncompresses it and then writes it to disk. On a default Storage Mirroring connection, compression is disabled.

For any replication set that may generate a significant amount of data, you should enable compression for the connection. For more information about enabling compression, see the *Storage Mirroring User's Guide*. However, keep in mind that the process of compressing data impacts processor usage. If you notice an impact on performance while compression is enabled in your environment, either adjust to a lower level of compression, or leave compression disabled.

Configuring memory usage

Storage Mirroring uses memory to queue operations and data on both the source and target. Since the source server is typically running a production application, it is important that the amount of memory Storage Mirroring and the other applications use does not exceed the amount of RAM in the system. If the applications require more memory than there is RAM, the system will begin to swap pages of memory to disk and the system performance will degrade.

For instance, SQL Server will use all of the available system memory when needed by default, and it may use almost all of the system memory during high-load operations. These high-load operations are precisely what cause Storage Mirroring to need memory to queue the data being changed by SQL Server. On a server with 1 GB of RAM running SQL Server and Storage Mirroring, you might configure SQL Server to use only 512 MB and Storage Mirroring to use 256 MB, leaving 256 MB for the operating system and

other applications on the system. Many other server applications will use almost all system memory by default, so it is important to check and configure applications appropriately, particularly on high-capacity servers.

Sample Implementation

This section describes an example of how to configure Storage Mirroring and Rational Software. Use these procedures as a guideline for creating your own implementation. Because no two environments or configurations are exactly the same, you will probably need to implement additional or different steps than what is documented here in order to make the solution work in your environment.

Requirements

Due to the complexities of these instructions, this document is intended for network administrators with experience installing, configuring, and maintaining network applications, including Storage Mirroring, Rational, and Microsoft SQL Server.

- Two licensed copies of Microsoft Windows 2000 with the latest service pack
- Two licensed copies of each Rational component (ClearCase, ClearQuest, and/or RequisitePro)
- The source and target must be located in the same domain to maintain file security and ownership
- Two licensed copies of Storage Mirroring 4.x with the latest pack
- The Storage Mirroring Chngname utility

NOTE: The Chngname.exe utility is available in the Tools directory when you download the product from the following web site: <http://www.openview.hp.com/downloads/downloads.html>.

Protecting your Rational data

In this section, you will be:

- Installing and Configuring ClearCase, ClearQuest, and/or RequisitePro
- Installing Storage Mirroring
- Configuring Storage Mirroring for mirroring and replication
- Configuring Storage Mirroring for failover

Install and configure the Rational Tools.

1. Install ClearCase, ClearQuest, and/or RequisitePro on the source, if they are not already installed.

2. Record the drive and directory where your critical Rational files are located.

Product	Component	Default Location	Your Location
ClearCase	VOB directories ¹²		
	Registry	cc_install\var\rgy	
	License	cc_install\common\rational*.dat	
	View server ³		
ClearQuest	Schema and user databases ⁴	db_install\log db_install\data ⁵	
RequisitePro	Test Data Store Project Paths ⁶	rq_install	

1. Include both the main VOB server and any secondary VOB servers.
2. A list of VOB directories can be obtained from the cleartool lsvob command.
3. A list of the VOB storage space can be obtained from the cleartool lsview -host <server> command.
4. If you are using Microsoft SQL Server, use the Enterprise Manager, Database Properties to determine the location of the database files.
5. By default, Microsoft SQL Server stores files in the \log and \data directories. If you are using a different database, select the appropriate directories for your application.
6. Use the RequisitePro Rational Administrator to determine the location of these files.

3. Install the same applications (ClearCase, ClearQuest, and/or RequisitePro) on the target making sure that you specify the same file locations that you recorded in the previous table.



NOTE: You do not need to install any ClearCase VOBs or view storage locations on the target.

4. On the target, set the following ClearCase services to manual startup so that all of the files are closed on the target. This allows the changes from the Storage Mirroring source to be written to disk on the target as soon as they are received.

- Atria Location Broker

- Atria Lock Manager
- Atria Cred Manager

NOTE: If a failure should occur, the failover script that you will be creating will automatically start the Rational services on the target.

The Atria Location Broker service on the target must be started using the same network account that is used on the source.

5. On the target, set the ClearQuest and RequisitePro services to manual startup so that all of the files are closed on the target. The services will depend on the database application you are using. For example, if you are using Microsoft SQL Server, you would set the following services to manual startup:

- Distributed Transaction Coordinator
- MS SQL Server
- SQL Server Agent

Depending on your environment and your application, there may be additional services to consider beyond just the application basics. For example, Message Queuing is an optional service for Microsoft SQL Server. Check your database documentation to determine the names of the services used by your database application.

NOTE: If a failure should occur, the failover script that you will be creating will automatically start the Rational services on the target.

6. Configure ClearCase on the target.

- Create the user `clearcase_albd` on the target server, if the target is in a different domain.
- Verify that the permissions assigned to the `clearcase_albd` user grants full control to the following:
 - `C:` (or the volume where ClearCase is installed)-
 - `C:\WINNT` (or the location where Windows is installed)
 - `C:\WINNT\system32` (or the location where Windows is installed)
 - The ClearCase installation directory and all of its subdirectories
 - The default temporary directory (`c:\documents and settings\administrator\local settings\temp`)
 - Server storage directory for each VOB (`*.vbs`)
 - VOB sever storage share (`ccstg_c` or parent directory of `*.vbs`)
- Verify that the permissions assigned to the VOB domain groups grants read, write, and execute control to the following:
 - Server storage directory for each VOB (`*.vbs`)
 - VOB sever storage share (`ccstg_c` or parent directory of `*.vbs`)

7. Configure ClearQuest on the target.

- Create the ClearQuest administrator login on the target server, if it does not already exist.
- Verify that the ClearQuest administrator is granted permissions to `cqschema` and all user databases with the roles as public and db owner.

Install Storage Mirroring

Install Storage Mirroring on both the source and target using the installation defaults.

Configure Storage Mirroring for mirroring and replication

1. Right-click the source and select **Properties**.
2. On the Source tab, enable **Block Checksum All Files on a Difference Mirror** and click **OK**.
3. Right-click your source machine and select **New, Replication Set** and enter the desired name for the replication set.
4. Select the critical Rational data that needs to be available on the target if the source fails. This includes all of the file locations that you specified in step 2 earlier. (It is not necessary to replicate the application files since they already exist on the target machine.)
5. Right-click the replication set name and select **Save** to save the replication set.
6. Drag and drop the replication set onto the target. The Connection Manager dialog box opens.
7. The **Source Server**, **Target Server**, **Replication Set**, and **Route** fields will automatically be populated. If you have multiple IP addresses on your target, verify the **Route** field is set to the correct network path. (For detailed information on connecting a source and target, see the *HP OpenView Storage Mirroring user's guide*.)
8. Select **One to One** to map the replication set data from the source to an identical volume/directory structure on the target.
9. Click **Connect** to start the mirror and replication processes.



NOTE: If you start Rational and mount the replicated databases on the target, or if the data on the target is otherwise modified, the data on the source and target will no longer match. If the updated data on the target is not needed, perform a full or difference with block checksum mirror from the source to the target. If the updated data on the target is needed, restore the data from the target to the source.

At this point, you have actually established a Rational disaster recovery configuration. (Disaster recovery in this context means that the data is located on a target machine. This may not meet the policy requirements of your organization.) This disaster recovery model can be extended to provide enhancements to your backup process. Because Rational recommends locking the ClearCase VOBs so that the last database checkpoint will be written to disk, you can perform this lock and subsequent backup on your Storage Mirroring target thus eliminating downtime on the source and to your end users.

After the initial mirror is complete, the target machine will have the same Rational data as the source. Replication will keep the two machines synchronized.

Configure failover and begin failure monitoring.

1. If a failure occurs, you will want to have the Rational services start on the target machine automatically. To do this, create a batch file called `postover.bat` using the following sample batch file. Save the batch file to the same directory where your Storage Mirroring files are installed.

SAMPLE_POSTOVER.BAT

```
rem This command temporarily changes the name of the server. The Chngname utility should be downloaded and
rem placed in the same directory where Storage Mirroring is installed. Replace <drive>:\<directory>\ in the
rem command
rem below with that location and replace source_name with the name of the source machine.
<drive>\<directory>\chngname /s source_name

rem If you are using ClearCase, use the following commands to start the ClearCase services.
net start "Atria Location Broker"
net start "Atria Lock Manager"
net start "Atria Cred Manager"

rem If you are using ClearQuest, start your database services. The following example commands start a SQL
rem database. Substitute the appropriate service names based on the database application you are using.
net start "Distributed Transaction Coordinator"
net start "MSSQLServer"
net start "SQLServerAgent"

rem After starting the required services, change the name of the server back to its original target name.
rem Substitute the location of the Chngname utility for <drive>:\<directory>\
<drive>\<directory>\chngname /t
```



NOTE: If you have a separate database application for RequisitePro, you will have to add those services to the `postover.bat` script as well as the next one.

2. After a failure is resolved, you can bring your source back online. If you do this, you will want to stop the Rational services on the target automatically. To do that, create a batch file called `preback.bat` using the sample batch file below. Save the batch file to the same directory where your Storage Mirroring files are installed.

SAMPLE_PREBACK.BAT

```
rem If you are using ClearCase, use the following commands to stop the ClearCase services.
net stop "Atria Location Broker"
net stop "Atria Lock Manager"
net stop "Atria Cred Manager"

rem If you are using ClearQuest, stop your database services. The following example commands start a SQL
rem database. Substitute the appropriate service names based on the database application you are using.
net stop "Distributed Transaction Coordinator"
net stop "MSSQLServer"
net stop "SQLServerAgent"
```

3. Open the Failover Control Center (**Start, Programs, Storage Mirroring, Failover Control Center**).
4. Select the target machine from the list of available machines. If the target you need is not displayed, click **Add Target**, enter the machine name, and click **OK**.
5. Click **Login** to login to the target machine.
6. To add a monitor for the selected target, click **Add Monitor**. Type the name of the source machine and click **OK**. The Monitor Settings window will open.
7. In the Monitor Settings window, mark the IP address that is going to failover.
8. Click **Scripts** and specify the scripts that were created earlier.
9. Highlight the machine name under Names to Monitor and click Scripts. Specify the scripts that were created earlier using `postover.bat` for the target post-failover script and `preback.bat` for the target pre-failback script.

NOTE: The scripts are processed using the same account running the Storage Mirroring service.

10. Click **OK** to go back to the Monitor Settings dialog box.
11. If you are using Active Directory, complete the following steps.

- a. Enable **Failover Hostname** so that the host SPN is removed from Active Directory on the source and is added to the target.
- b. Enable **Failback Hostname** so that the SPN is returned to the original settings on both the source and target during failback.
- c. Click **Account** and identify a user and the associated password that has update privileges within Active Directory. This allows SPNs to be created and deleted during failover and failback. Click **OK** to return to the Monitor Settings dialog box.
- d. Click **OK** to begin monitoring the source machine.

In the event of a source machine failure, your target machine is now ready to stand in for your source. For details on monitoring failover, see the *HP OpenView Storage Mirroring user's guide*.

After a source failure

As long as Storage Mirroring is replicating, if the source machine fails, the target machine contains the latest Rational data. If a failure occurs, failover will start the services on your target and your pre-configured Rational tools will be available to the users from the target. Users may need to restart their client applications to establish a connection to the target, standing in for the source.

Although no modifications are required, Rational recommends running the ClearCase command `checkvob` when the VOBs are brought down without using their documented procedures. `checkvob` confirms that any source modification is recorded in its underlying database. If there are inconsistencies between a modification and its entry in ClearCase's underlying database, `checkvob` corrects them. If a modification was saved just before the ClearCase server failed and the entry is not in the ClearCase database, `checkvob` indicates the problem and ask for permission to remove the modification. Use the following command to verify the consistency of the data.

```
cleartool checkvob -pools -fix [-force -ignore] <global vob path>
```

At this time, it is possible to designate the target as your new source. If you do that, you will not need to restore anything back to your original source. You can locate a new target and repeating the configuration steps, use the new pair of machines to protect your Rational data. But if you prefer to revert back so that your source is running on its original machine, you can continue with the next section.

Reverting back to the original configuration

It is possible to skip this section by designating the target as your source and using another machine as the new target, but if you prefer to revert back to your original source machine, use these instructions.

1. Verify that your original source machine is not connected to the network. If it is, disconnect it.
2. Resolve the source machine problem that caused the failure.



NOTE: If you must rebuild your hard drive, continue with step 3. If you do not need to rebuild your hard drive, continue with step 6 below.

-
3. Install Windows. Since your source machine is not connected to the network, go ahead and use the source's original name and IP address.
 4. Install Storage Mirroring using the installation defaults.
 5. Install Rational using the same file locations recorded in step 2 under "[Protecting your Rational data](#)" on page 5.
 6. **Verify that Rational is not running on the source.** The Rational services must not be running at this time so that you can restore the updated data on the target back to the source. Depending on the type of failure, your services may still be running. **Stop your Rational services.**
 7. Select **Start, Programs, Storage Mirroring, Failover Control Center**.
 8. Select the target machine that is currently standing in for the failed source.

9. Select the failed source and click **Failback**.

The pre-failback script entered during the failover configuration stops the Rational services on the target so that no additional changes can be made.

10. You will be prompted to determine if you want to continue monitoring the source server. Do not choose **Continue** or **Stop** at this time.
11. Connect the source machine to the network.
12. Open the Storage Mirroring Management Console (**Start, Programs, Storage Mirroring, Management Console**), highlight the source machine, and ensure that the Rational replication set is not connected so that replication does not continue after failback is complete. If the replication set is connected, disconnect it by right-clicking it and selecting **Disconnect**.
13. After the source is back online, select whether or not you want to continue monitoring this source machine.
14. To begin the restoration process, open the Storage Mirroring Management Console and select **Tools, Restoration Manager**.



NOTE: You can also run the Storage Mirroring DTCL automated restoration script, which can be found in the *HP OpenView Storage Mirroring's user's guide*, to complete the remaining steps in this section.

15. Complete the appropriate fields as described below.
 - **Original Source**—The name of the source machine where the data originally resided.
 - **Restore From**—The name of the target machine that contains the replicated data.
 - **Replication Set**—The name of the replication set to be restored.
 - **Restore To**—The name of the machine where the data will be restored. This may or may not be the same as the original source machine.
16. Identify the correct drive mappings for the data and any other restoration options necessary. For detailed information on the restoration options, see the *HP OpenView Storage Mirroring user's guide*.
17. Verify that the selections you have made are correct and click **Restore**. The restoration procedure time will vary depending on the amount of data that you have to restore. During the restoration, users will be unable to access Rational.
18. After the restoration is complete, start the Rational services on the source machine.
19. Reestablish the Storage Mirroring Rational replication set connection.

At this time, your data is restored back to your source machine, the source machine is again the primary Rational server, and, if you selected to continue failover monitoring, the target is available to stand in for the source in the event of a failure.